OXFORD INDUSTRIAL DECARBONISATION PROJECT

Industrial Landscape and Baseline

AN ERM REPORT FOR THE ZERO CARBON OXFORD PARTNERSHIP

FEBRUARY 2025

ZERO CARBON OXFORD

Introduction to this report, authors, and disclaimer

ABOUT ERM

Sustainability is our business. As the largest global pure play sustainability consultancy, ERM partners with the world's leading organizations, creating innovative solutions to sustainability challenges and unlocking commercial opportunities that meet the needs of today while preserving opportunity for future generations.

ERM's diverse team of 8,000+ world-class experts in over 150 offices in 40 countries and territories combine strategic transformation and technical delivery to help clients operationalize sustainability at pace and scale. ERM calls this capability its "boots to boardroom" approach - a comprehensive service model that helps organizations to accelerate the integration of sustainability into their strategy and operations.

ERM acquired Element Energy and E4tech in 2021, which are now fully integrated in ERM's Sustainable Energy Solutions (SES) team. The team consists of over 150 specialists bringing deep expertise in the development, commercialisation, and implementation of emerging low-carbon technologies across a wide range of sectors, including industrial decarbonisation (hydrogen, carbon capture utilisation and storage, electrification), low carbon fuels and chemicals, the built environment, smart energy systems, electricity and gas networks, low carbon transport and funded project management.

Authors

Silvian Baltac Partner

Amelia Mitchell Managing Consultant

Edward Grindrod Consultant

About this document

This document reports the findings from WP1 of the ZCOP Local Industrial Decarbonisation Roadmap (LIDP) project, investigating the energy and emissions landscape of Oxford's industrial sector.

Link to other work

The report sets the foundations for the analysis throughout the LIDP project. In combination with the database baselining energy demand and emissions in Oxford, the outcomes of this work underpin the rest of the project analysis. Understanding the scale, location, and processes leading to industrial emissions in Oxford is fundamental to assessing the suitability of different decarbonisation technologies (WP3) and understanding the decarbonisation measures required to reach net zero by 2040 (WP4).

The report also draws heavily upon stakeholder engagement activities delivered through WP2.

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Department for Energy Security & Net Zero

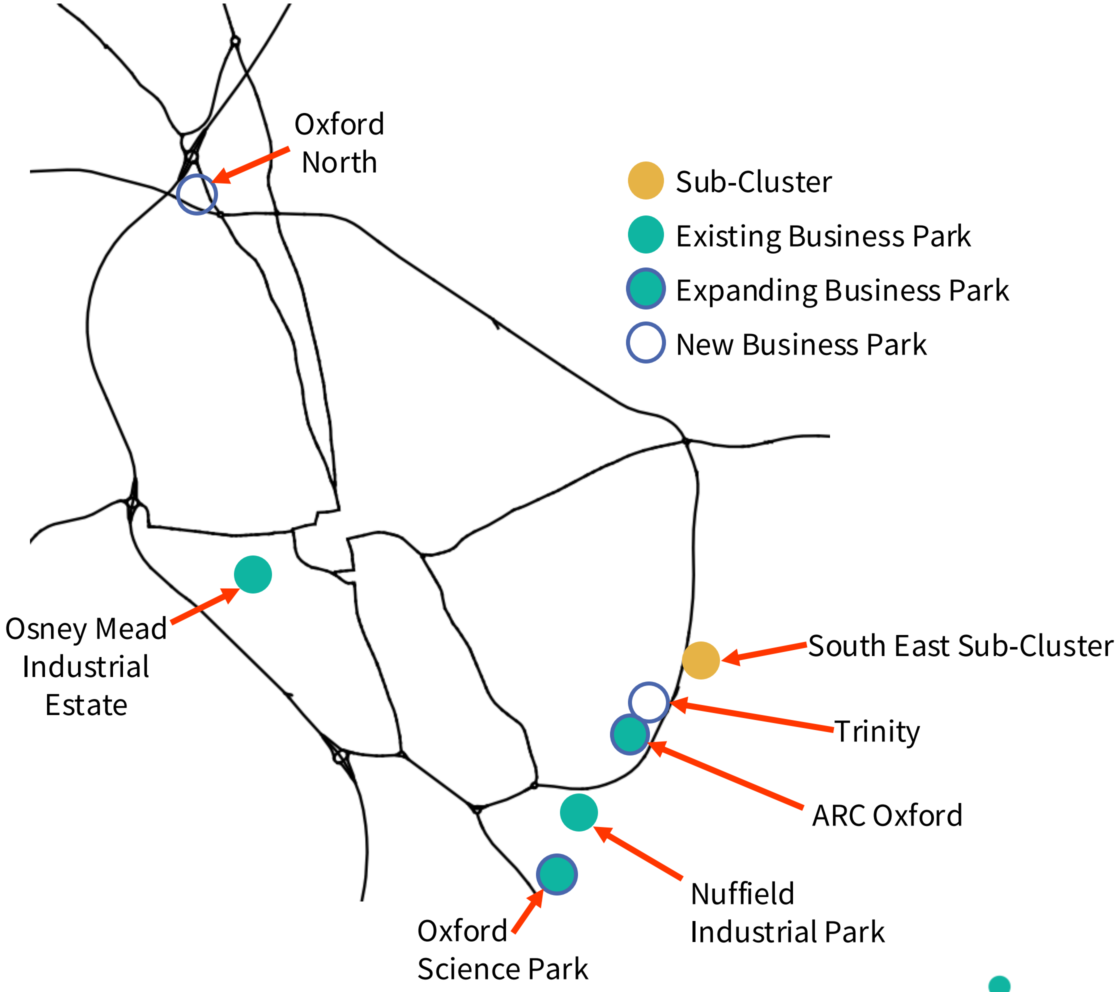
Contents

Oxford's Industrial Landscape & Baseline

Oxford includes a large industrial sub-cluster, several industrial business parks, and many dispersed industrial sites

- The ZCOP Local Industrial Decarbonisation Roadmap (LIDP) project investigates decarbonisation of the Oxford Industrial Cluster. Oxford's industrial sector is characterised by **dispersed small and medium-sized enterprise (SMEs), numerous university spin-outs**, **few larger emitters**, and clusters of energy users concentrated in **business/science parks**.
- The project defines the Oxford Industrial Cluster as **organisations who manufacture, process, or produce goods in Oxford City Council,** including the key sectors of high-tech engineering, life sciences, and automotives. Examples of produced goods include biological materials, chemicals, electronic hardware, and medical equipment.
- **The Oxford Industrial Cluster has three core site types defined by their location and scale;**
  - **The primary sub-cluster of industrial activity is in South-East Oxford** which includes some of the largest individual industrial sites in Oxford.
  - Oxford also **has several large business parks**, such as ARC Oxford and Oxford Science Park, which are dominated by life sciences and pharmaceutical SMEs. Co-location of industrials within such business parks offers potential for collaborative decarbonisation solutions.
  - Oxford also has an **important component of dispersed industrials** integrated areas across the city, including in the city centre.
- The Oxford Industrial Cluster therefore represents a complex and heterogeneous industrial landscape that will require a selection of complementary, integrated, and innovative decarbonisation solutions.

Map of current and future industrial hubs within the Oxford Industrial Cluster



Oxford has a range of innovative industrial sectors, including life sciences and high-tech engineering

Previous studies have noted the most prevalent industrial sectors in Oxford are high-tech engineering, pharmaceuticals, and automotives.[1]

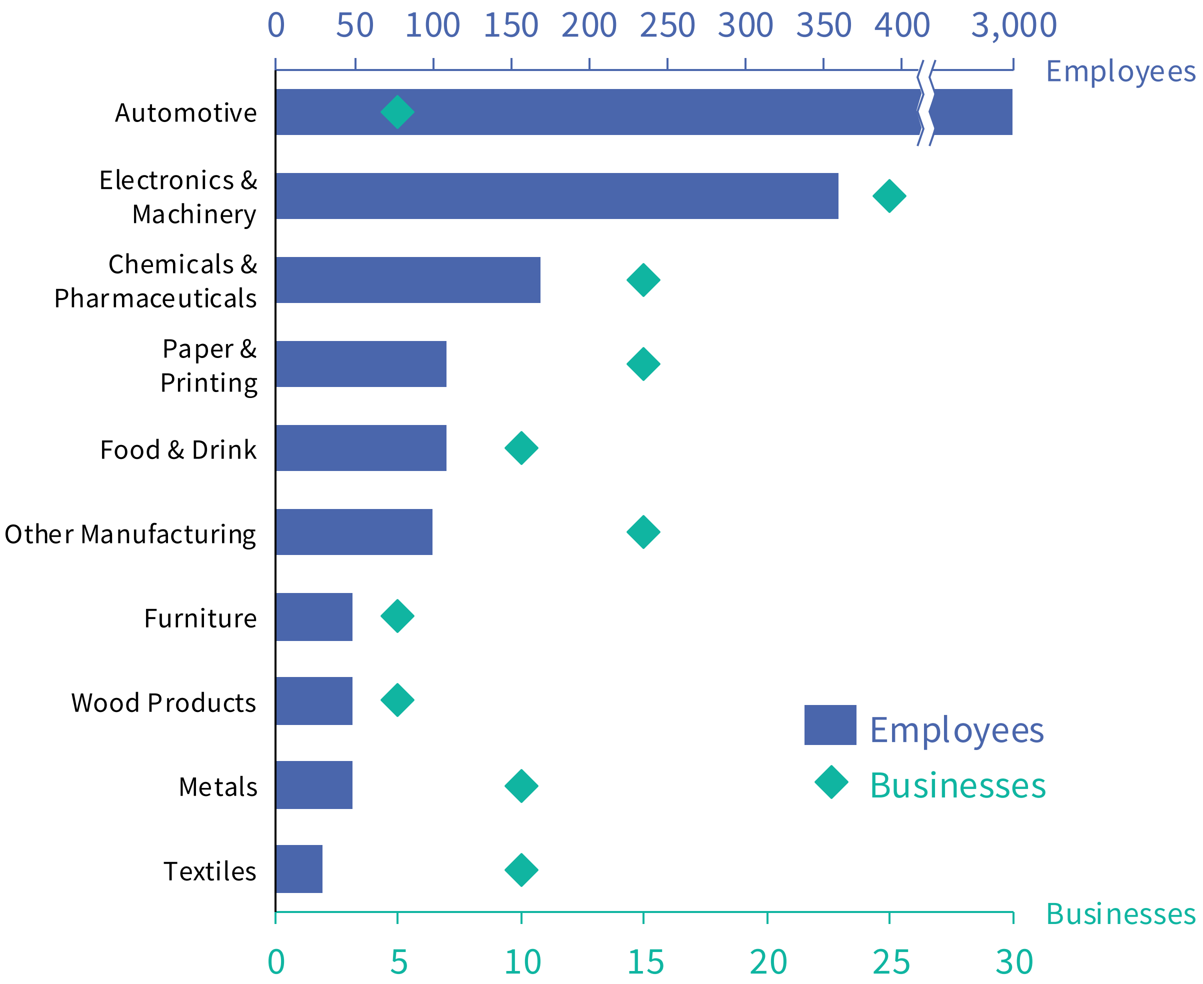
Analysis of national employment datasets[2] reveals an extended set of industrial sectors present in Oxford:

- The **automotive sector**, namely Mini Plant Oxford, which is the largest single site in Oxford by a significant margin.
- **High-tech engineering**, primarily the manufacturing of machinery and electronics.
- Sizeable **pharmaceuticals, life sciences, and chemicals** sectors.
- A **paper and printing sector** which is primarily composed of paper products and commercial printing operations.
- A varied range of **food preparation and distribution** companies, including several distilleries.

A strong scientific research sector is led by the universities and acts as a key driver of industrial innovation in the region.[3]

Furthermore, it was found that most industrial businesses in Oxford have a relatively low average number of employees, highlighting the innovative and SME driven nature of Oxford's industrial landscape.

Breakdown of industrial employment and business count by sector[2]

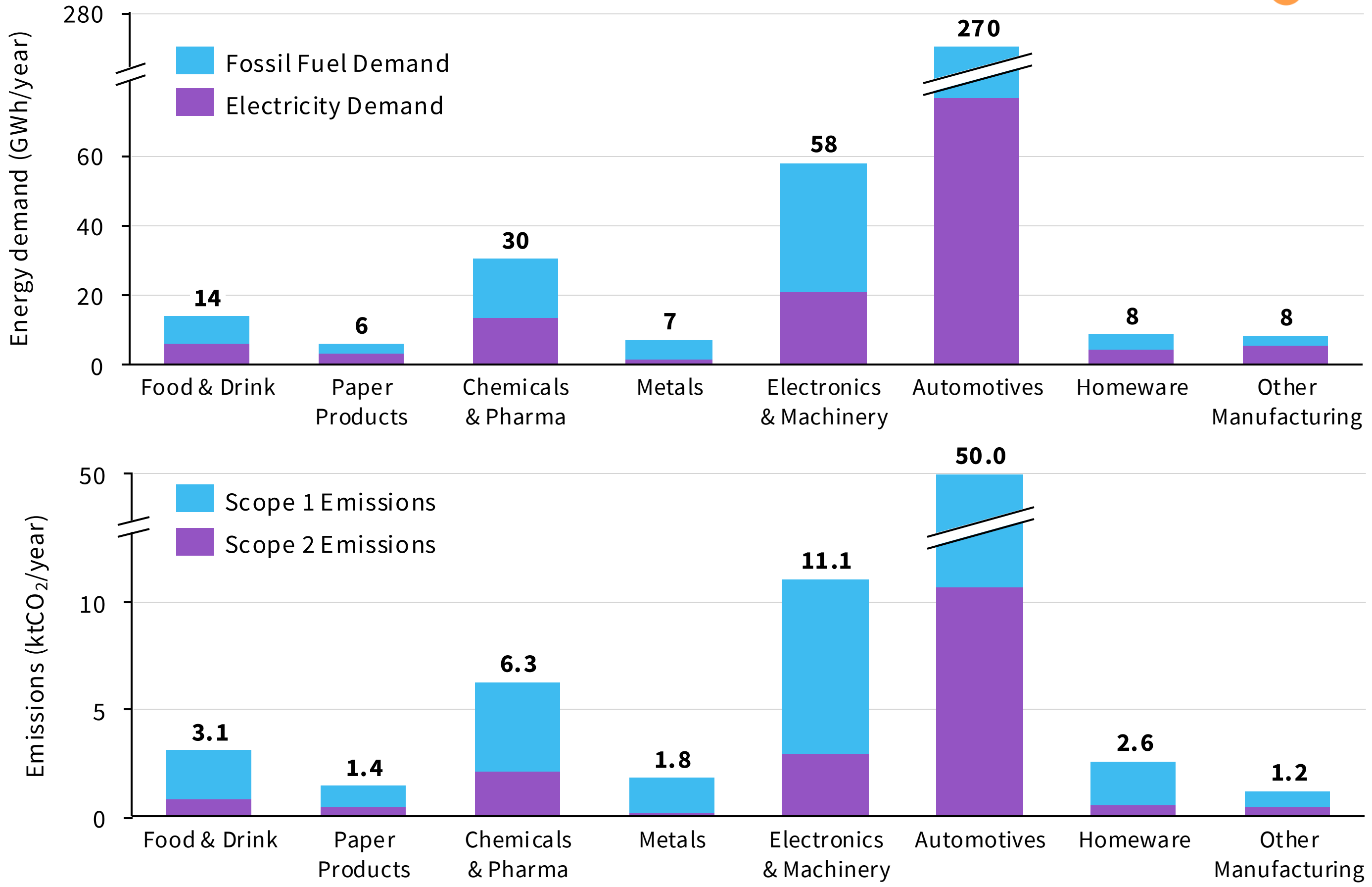


1 - Roadmap and Action Plans - Zero Carbon Oxford Partnership. 2 - See methodology appendix slides. 3 - Research is deemed as complementary to Oxford's industrial sector so is not included directly in the data analysis provided here.

The automotives sector dominates the industrial energy demand and emissions baseline in Oxford

- Oxfordshire's Net Zero Route Map & Action Plan[1] concluded **16% of emissions (620 $ktCO_2$/year) from the county** originated from industry.
- The 2018 ZCOP Roadmap[2] allocated **17% of Oxford City's total emissions, or 123 $ktCO_2e$/year,** as of industrial origin.
- Further analysis for this roadmap, focused specifically on Oxford's industry, suggests the total energy demand in Oxford's industrial sectors is **just over 400 GWh, with nearly three-quarters currently provided by natural gas.**
- Resulting **Scope 1 & 2 emissions are estimated to total approximately 77 $ktCO_2$/year.**
- **Energy demand and emissions are dominated by the automotives sector,** which produces over half of industrial emissions in Oxford.
- Other sectors with significant contributions align with previous reports and stakeholder engagement; namely the pharmaceuticals and life sciences sectors, and the advanced engineering industry in electronics and machinery.

Energy demand (top) and emissions (bottom) in Oxford by industrial sector



Source: *ERM analysis of national datasets (DUKES and ONS) complemented by primary data from stakeholder engagement.*
Limitations: *There is considerable uncertainty in the total energy demand and emissions having been derived from national statistics – see methodology appendix for details.*
Location-based accounting: *Analysis for this roadmap uses a location-based approach to emissions accounting (rather than market-based) meaning that the emission-intensity of electricity supplied via grid-connections is taken as the average UK electricity grid intensity. It is however noted that individual industrials may procure solely renewable electricity, allowing them to reduce or eliminate Scope 2 emissions when using a market-based accounting approach.*

Oxford's industrial activity can be characterised by direct and indirect heating processes and electric equipment

Oxford's key sectors are dependent on a wide range of different types of industrial processes.

Most processes are either powered by electricity or fossil fuels. **Stakeholder engagement suggests the use of solid or liquid fossil fuels in Oxford is very limited** and therefore all fossil fuel demand is presumed to be supplied as natural gas.

Survey and audit data highlighted gas-fired boilers, medical and lab equipment, chillers, and direct heaters as key equipment classes in Oxford.

Much of Oxford's light industrial processes will be electrically powered, such as assembly, fabricating, and packaging processes.

Natural gas processes can be subdivided into direct and indirect heating processes:

- **Direct heating**; flame in open air that passes directly over the target (e.g. furnaces, kilns).
- **Indirect heating**; a system where the combustion flue is separated from the system with the target (e.g. heat supply from CHP/boilers).

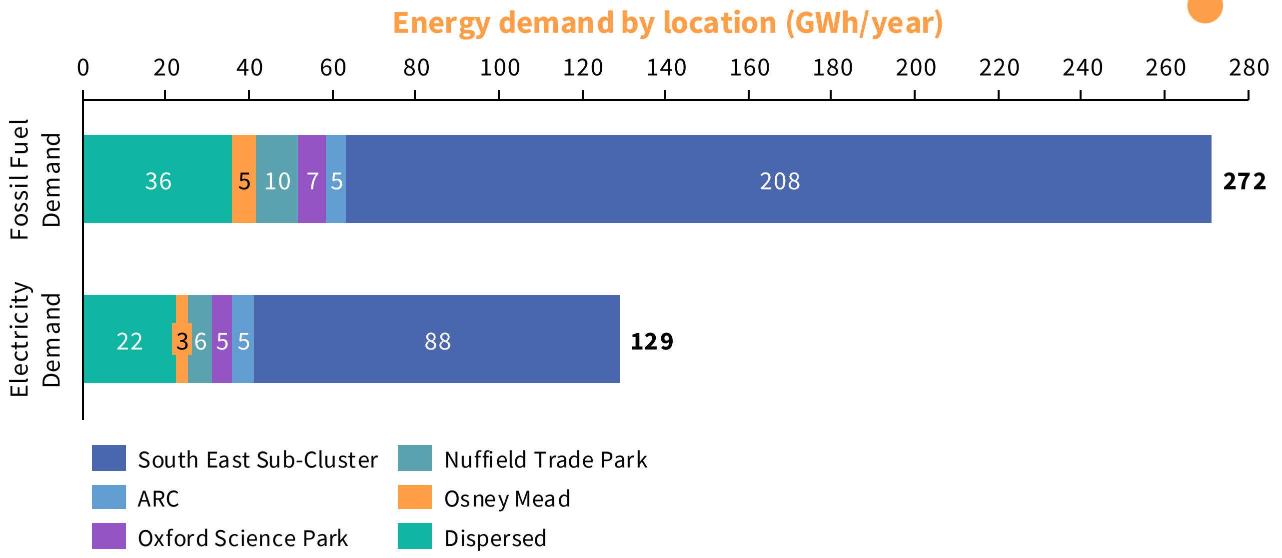
The **temperature of heating processes is important for assessing the viability of decarbonisation technologies**. High temperature processes (>100°C) may require less mature technologies, such as high temperature heat pumps.

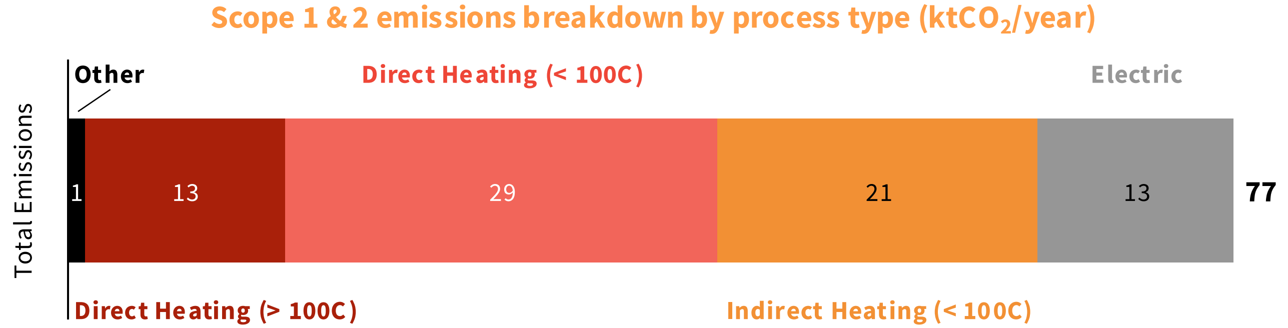
✓ Major energy use
✓ Minor energy use

	Conventionally gas fired				
	Direct Heating (< 100°C)	Direct Heating (> 100°C)	Indirect Heating (< 100°C)	Indirect Heating (> 100°C)	Electric
Automotive		✓	**✓**	**✓**	**✓**
High-tech Engineering	**✓**	✓	**✓**		✓
Pharmaceuticals	**✓**	**✓**	✓		**✓**
Paper Products	**✓**		✓		**✓**
Food and Drink	**✓**	✓	**✓**		✓

Mini Plant Oxford in the South-East Sub-Cluster represents the majority of Oxford’s industrial energy demand

- A locational breakdown highlights the South-East Sub-Cluster (dominated by Mini Plant Oxford) as by far the largest industrial energy consumer in Oxford.
- Excluding this South-East Sub-Cluster, the **business parks collectively contribute nearly half of remaining industrial activity in Oxford** with dispersed sites contributing the other half. Therefore, it is important to still highlight **dispersed sites as a key contributor to the landscape** of energy demand and emissions.
- **Low temperature (< 100°C) processes dominate the total emissions breakdown**. The emissions from high temperature heating are primarily from the automotives sector.
- **Direct heating processes are the largest contributor to scope 1 and 2 emissions**; however, this is again mainly driven by the automotives sector. Most other sectors have a more even balance of direct and indirect heating requirements.
- Electric processes (such as motors, pumps, and lighting) play a relatively small role in the overall emissions estimate, partly due to the lower emissions intensity of electricity supply. Nevertheless, much of the identified heating processes already, and will increasingly, rely significantly on electricity as an energy source.



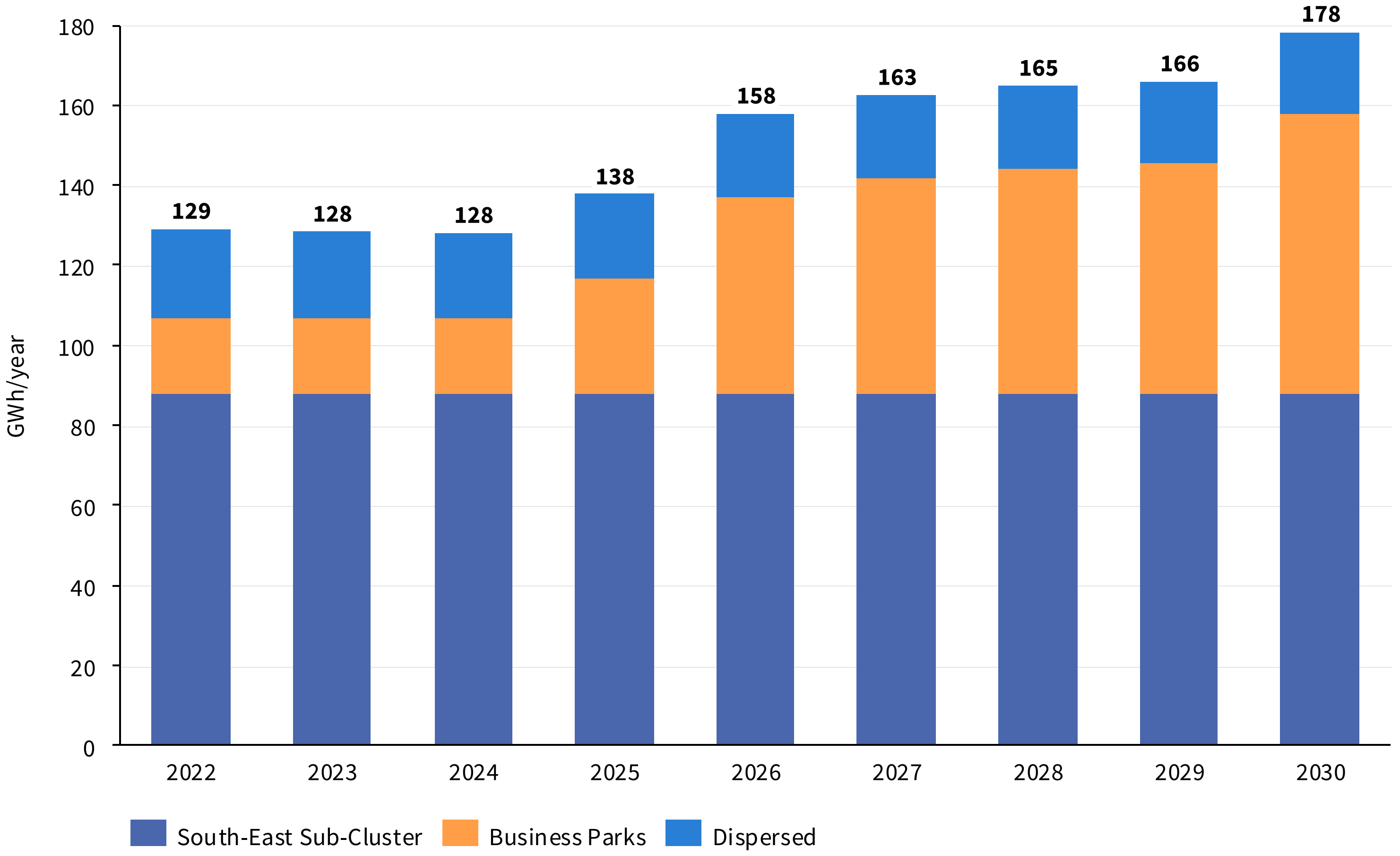


Based on ERM analysis of national datasets (DUKES and ONS) complemented by primary data from stakeholder engagement. See methodology appendix for details and limitations.

Industrial growth in Oxford is driven by the expansion of business parks for SMEs and innovative life science businesses

- Several developers are proposing or expanding existing business parks (ARC[1], Oxford North[2], Oxford Science Park[3], and Trinity by Breakthrough[4]); with hybrid lab-office spaces a growing commodity in the city demanded by university spin-outs and innovative SMEs.
- These developments will **increase the business park space available to life science and technology businesses by around 200,000 m^2 in 2030**.
- **New buildings are expected to be almost exclusively electrically heated and utilise electric industrial equipment**; creating additional demand for electrified industrial equipment, renewable energy generation, as well as energy storage and distribution.
- The future for individual dispersed sites is less clear. Aligned with UK projections[5] a slight decrease (12% by 2040) in overall energy demand for dispersed sites is anticipated.

Electricity demand projections for Oxford industrials (GWh/year)



1 – Lab Space for Innovators – ARC. 2 – Oxford North | A new innovation district opening in 2025. 3 – Trinity. 4 - The Oxford Science Park.
5 - Energy and emissions projections: 2022 to 2040 – Annex A.

Appendix – Methodology

Public datasets were used to understand Oxford's industrial energy use and emissions

Data

Public datasets were used to baseline energy demand and emissions for Oxford's industrial sectors[1,2], with additional stakeholder information from survey responses integrated when significant.

Analysis

Baseline Oxford energy demand and emissions: UK industrial energy demand is aggregated by sector from DUKES Energy Data whilst employee data was used to derive a scaling factor for each sector between the number of employees in the UK and Oxford.

Sectoral energy and emissions analysed by location, fuel type, and process: Analysis also provides a breakdown of the energy consumption by the fuel type and five key process types (high vs low temperature, direct vs indirect heating, electric). LSOA data was used to identify sites in different business parks to disaggregate energy and emissions into the key industrial geographies of Oxford.

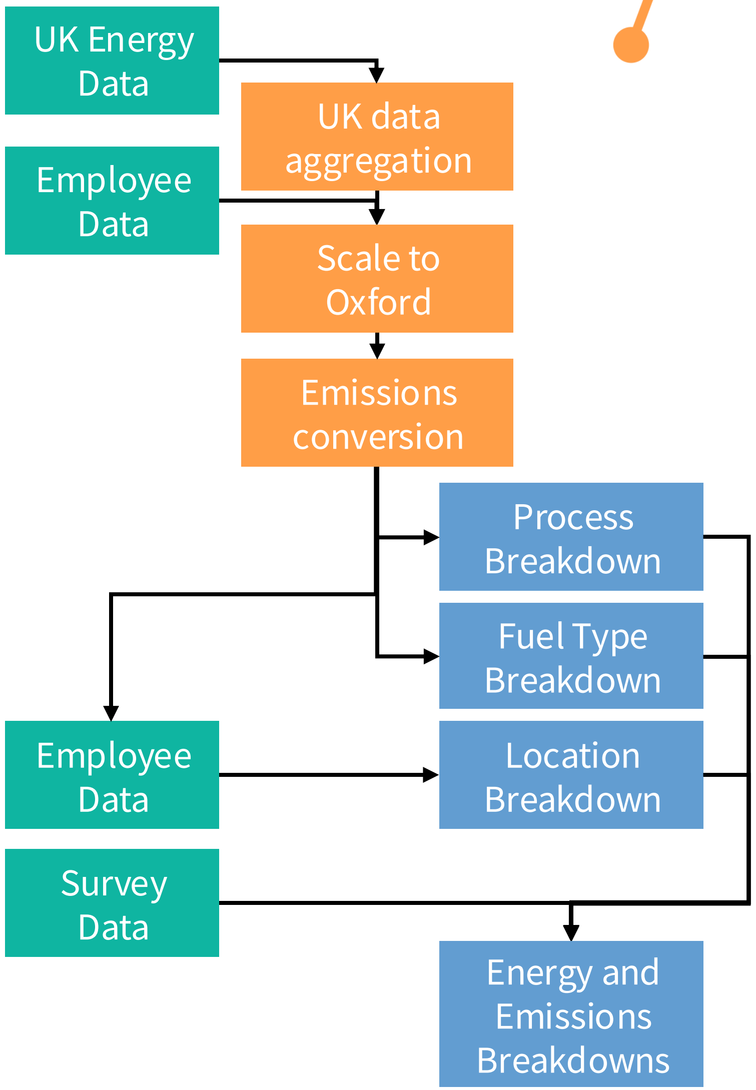
Limitations

The **Government datasets are UK wide so not perfectly representative of industrial energy demand and emissions in Oxford**. Some of the employee and business data is also rounded to ensure data protection/anonymity.

In an attempt to overcome this, the **project collected primary data from surveys and energy audits**. **Survey data from project partners was integrated into the final baseline** to reflect greater certainty in these major energy users.

Other survey and audit data was not considered sufficient to replace the top-down approach as only thirteen dispersed industrials - with total energy/emissions of ~44 GWh/year - were identified, compared to the estimated 100+ dispersed industrials in the City Council region according to the Government data. These **primary inputs also generally included less granularity on the industrial processes and energy demand split** than is available from the Government datasets. Further information on the survey and audits results can be found in this appendix.

Further work within the cluster should focus on closing this data gap and further refining the city's understanding of the industrial landscape.



1 - Dataset Selection - Query - Nomis - Official Census and Labour Market Statistics.
2 - Energy consumption in the UK 2023 (ECUK_2023_End_Use_tables.xlsx - Table U4). does not include energy demand from Scientific Research where many of Oxford's university spin-out and niche manufacturing companies lie.

Public energy statistics were used to estimate energy demand for Oxford's industrials across different applications

UK Energy Datasets

Sectoral archetypes for energy demand per employee were developed using the DUKES dataset (combined with UK employment data). The DUKES dataset allows for energy demands to be estimated across different process types.

- **Digest of UK Energy Statistics (DUKES) "UK Energy Data":** 2022 industrial final energy consumption by SIC code categorised by process type (e.g. High Temperature, Space Heating) and Fuel type (e.g., Natural Gas, Electricity).[2]
    - The DUKES data was mapped from its process classification to the five key process categories used in the report (see right).

Additional data from project partners was utilised to give the most representative overview of industry in Oxford available. This data was integrated with the final outputs, after the full analysis of the national datasets was completed.

Oxford Process Categories >>	**Direct Process Heating (< 100°C)**	**Direct Process Heating (> 100°C)**	**Indirect Process Heating (< 100°C)**	**Indirect Process Heating (> 100°C)**	**Electrical**
DUKES Process Categories >>	Drying / Separation	High Temperature Process	Space Heating Low Temperature Process		Motors Compressed Air Lighting Refrigeration

Energy consumption in the UK 2023 (ECUK_2023_End_Use_tables.xlsx - Table U4)

Public employment data was used to map industrial sectors and energy demands across locations in Oxford

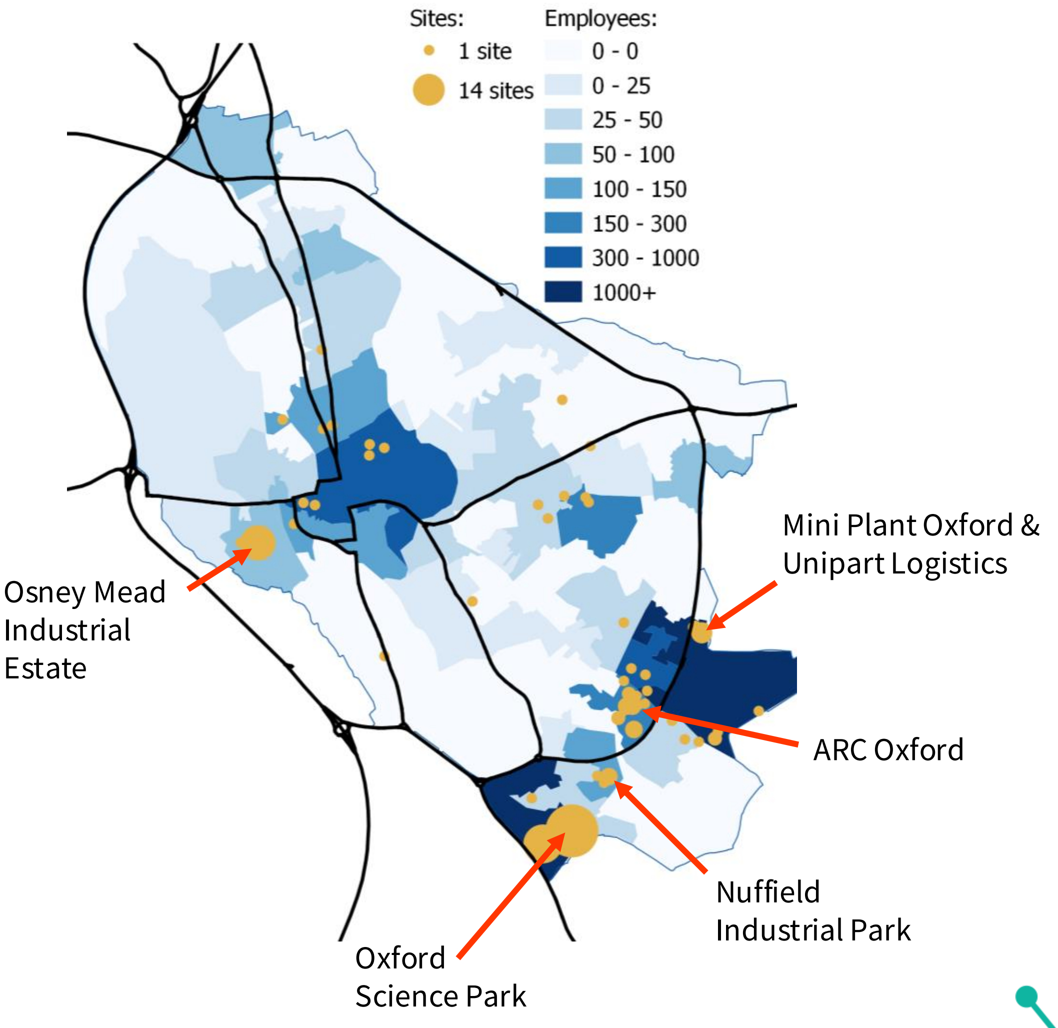
UK Employment Datasets

Employee data per LSOA was used to estimate energy and emissions across locations within the Oxford Industrial Cluster, including the South-East Sub-Cluster, business parks, and dispersed sites. Key datasets:

- **ONS "Employee Data":** 2022 employment survey giving the number of employees in each SIC code for every Lower Layer Super Output Areas (LSOA) in Oxford City.[1]
- **ONS "Business Data":** 2022 business data showing the number of industrials businesses by SIC code in Oxford. This is not used in the data analysis, but instead graphically in the report.

Mapping of individual SIC codes is available in the Appendix.

Map of industrial employment and sites in Oxford



[Dataset Selection - Query - Nomis - Official Census and Labour Market Statistics.](#)

The baseline growth of business parks was estimated based on announced project floor area

Growth Scenarios

LSOA data was used to identify existing sites in different business parks to disaggregate energy and emissions into the key industrial geographies of Oxford.

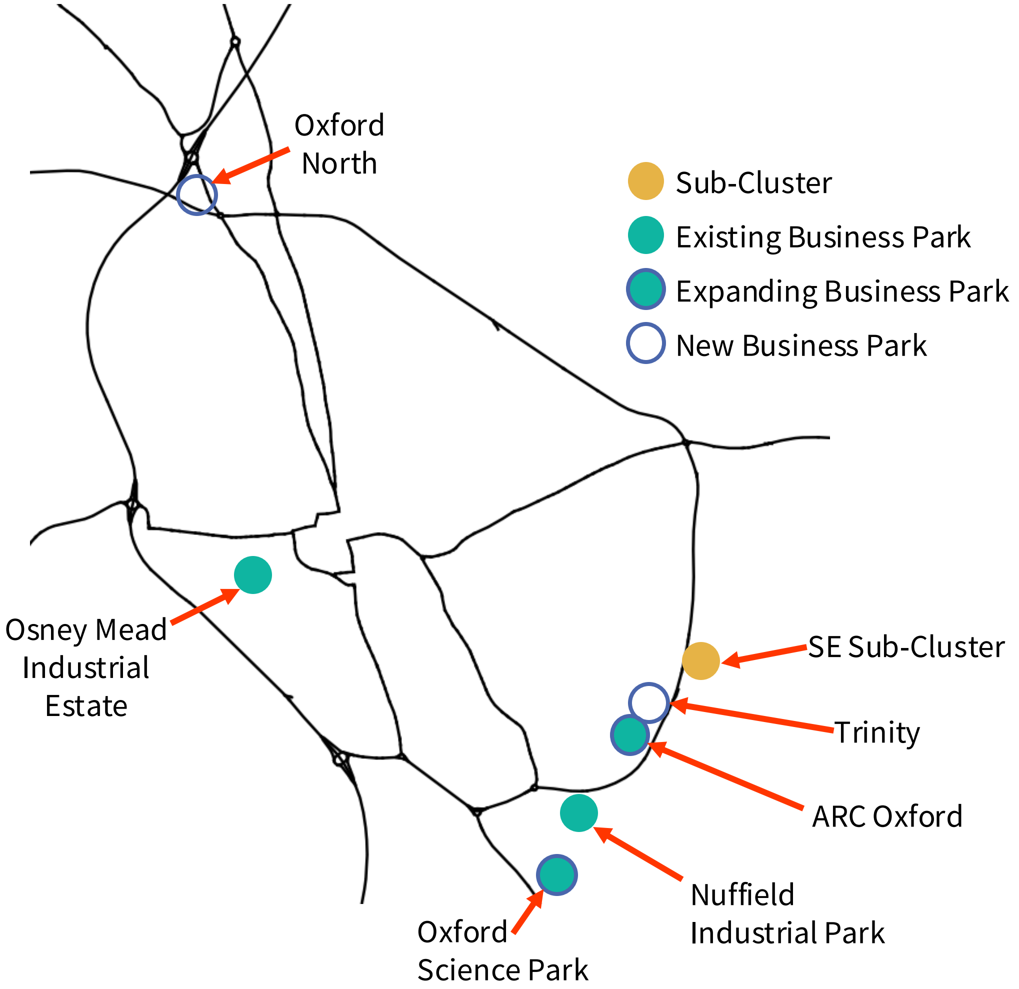
Several developers are proposing or expanding existing business parks which will increase the energy demand and emissions from business park facilities from life science and technology businesses by 2030.

New buildings are expected to be almost exclusively electrically powered. This will create additional demand for electrified industrial equipment, renewable energy generation, as well as energy storage and distribution.

Energy and emissions projections were calculated by multiplying public data about the **expected floor areas for each of the new developments with an archetypal energy intensity** based on stakeholder engagement.

Aligned with UK projections, a slight decrease (12% by 2040) in overall energy demand for dispersed sites is anticipated.

Map of current and future industrial hubs within the Oxford Industrial Cluster

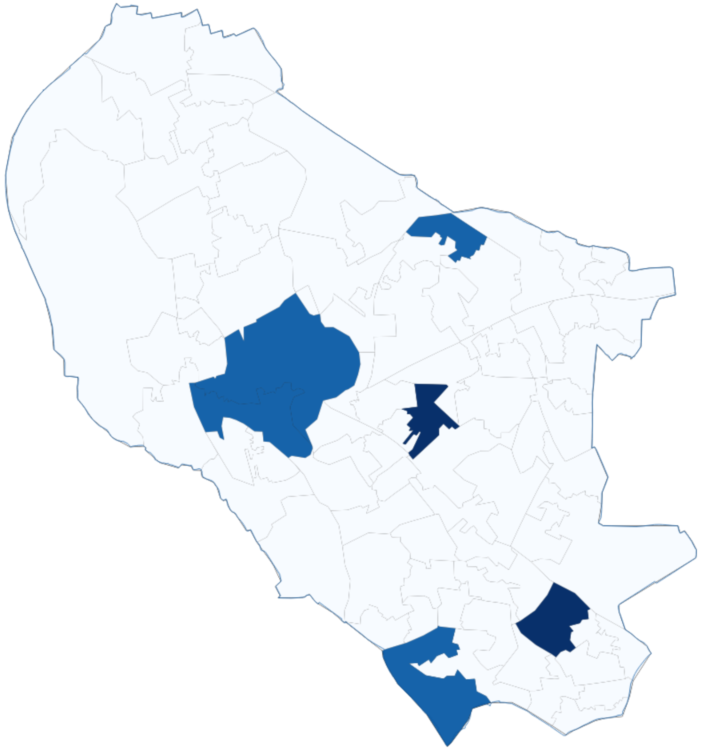


1 – Lab Space for Innovators – ARC. 2 – Oxford North | A new innovation district opening in 2025. 3 – Trinity.
4 - The Oxford Science Park. 5 - Energy and emissions projections: 2022 to 2040 – Annex A.

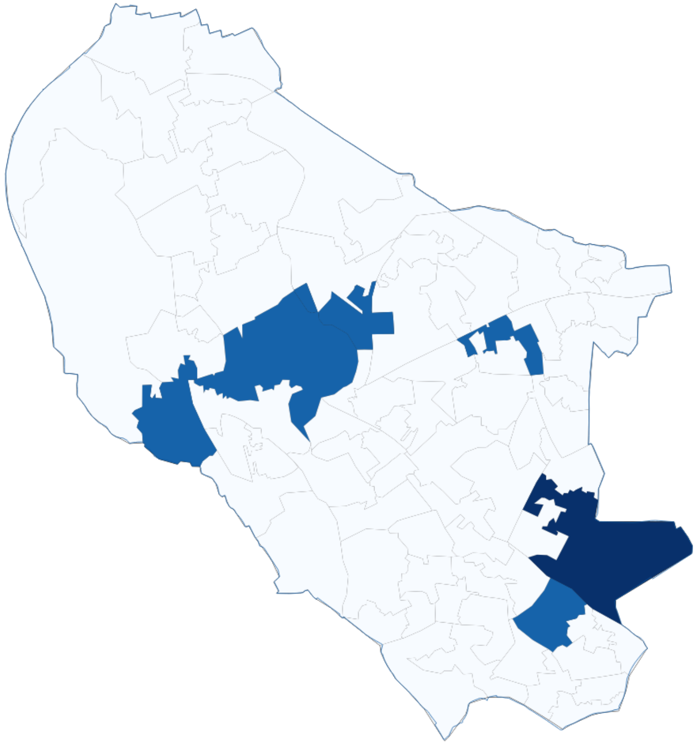
Appendix – Sector Mapping

Employee data reveals the broad locational trends of industrial sectors in Oxford (1/3)

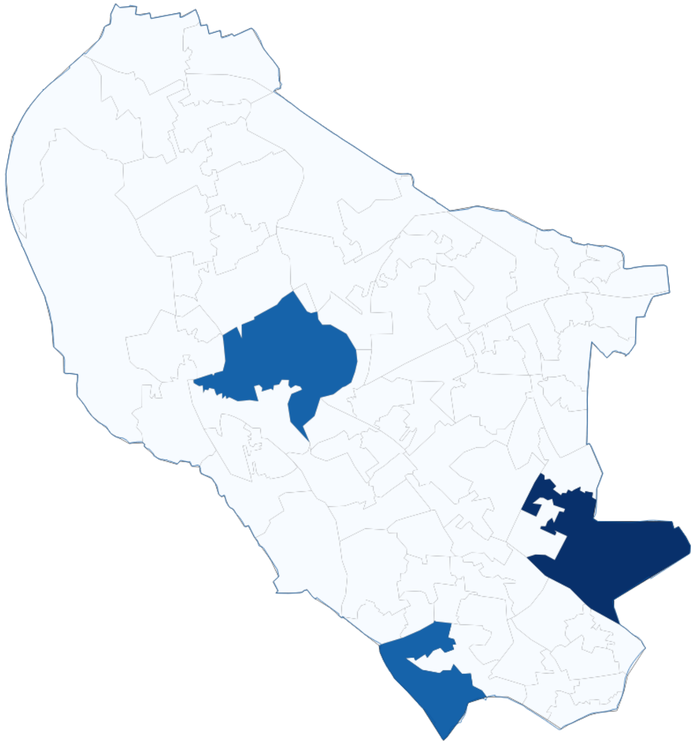
Food & Drink (100 employees)



Paper Products (110 employees)



Chemicals & Pharmaceuticals (170 employees)



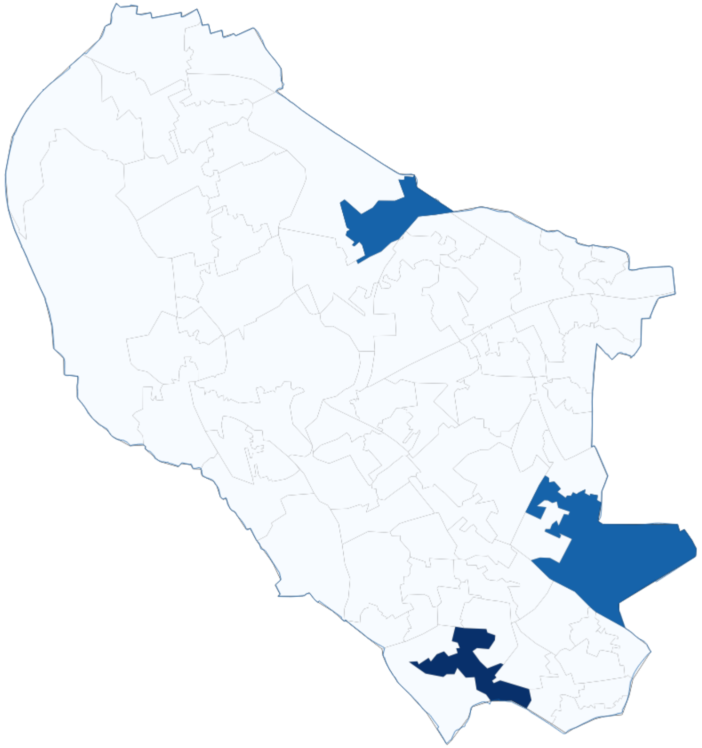
Scaling within each sector map:

More employees | Fewer employees

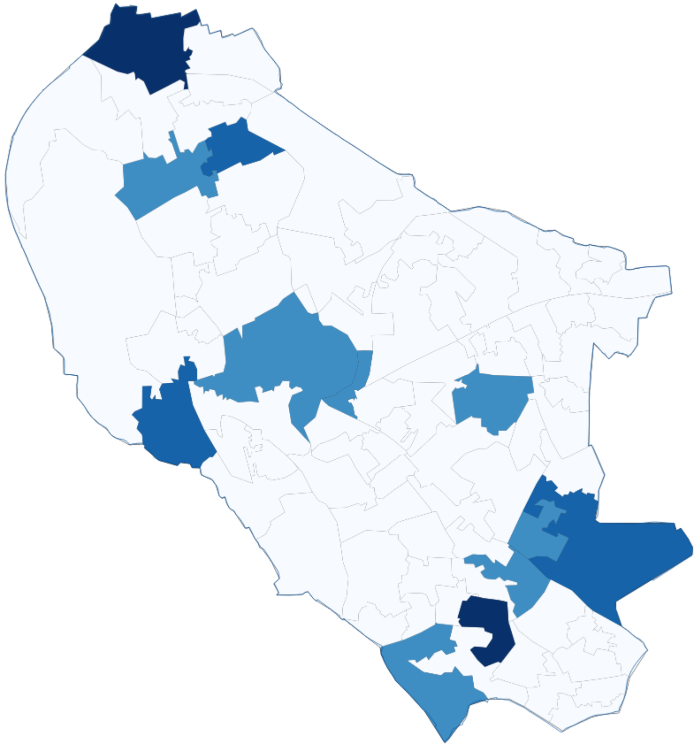
[Dataset Selection - Query - Nomis - Official Census and Labour Market Statistics.]()

Employee data reveals the broad locational trends of industrial sectors in Oxford (2/3)

Metals (50 employees)



Electronics & Machinery (350 employees)



Automotives (3000 employees)

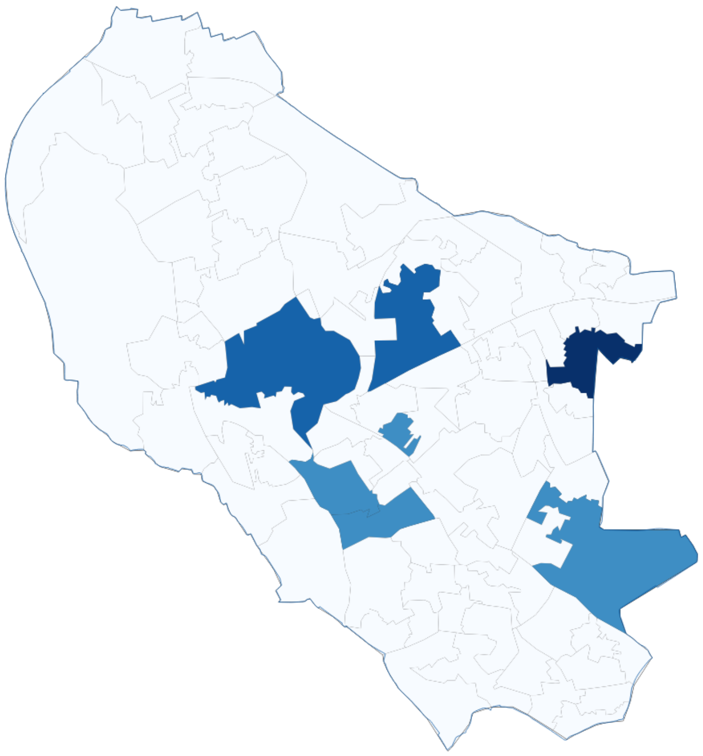
Scaling within each sector map:

More employees | Fewer employees

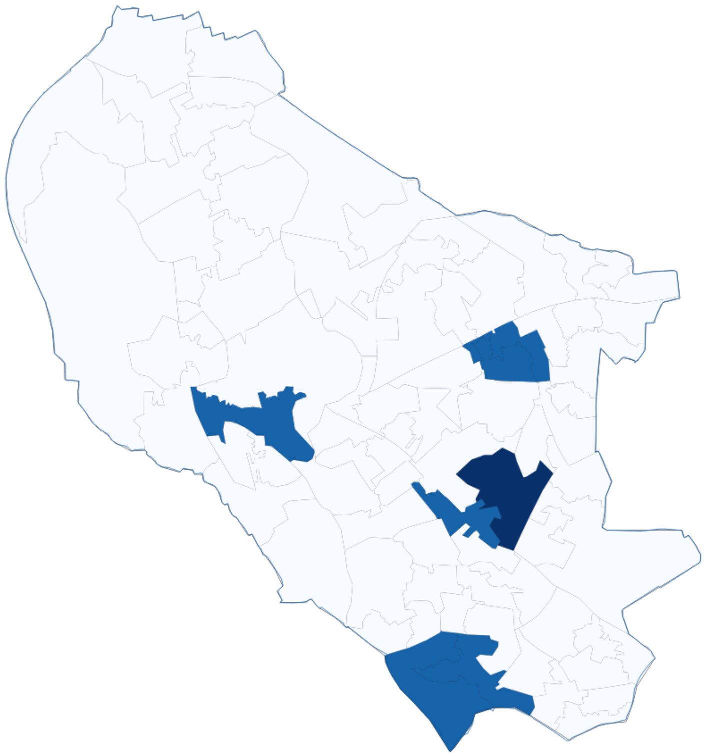
Dataset Selection - Query - Nomis - Official Census and Labour Market Statistics.

Employee data reveals the broad locational trends of industrial sectors in Oxford (3/3)

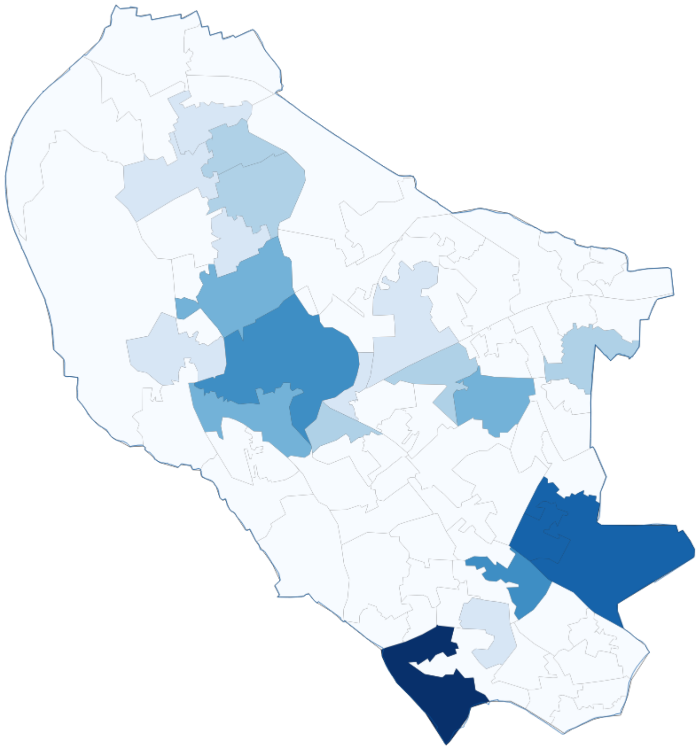
Homeware (130 employees)



Other Manufacturing (100 employees)



Research (>4000 employees)



Scaling within each sector map:

More employees ■ ■ ■ ■ ■ ■ ■ ■ Fewer employees

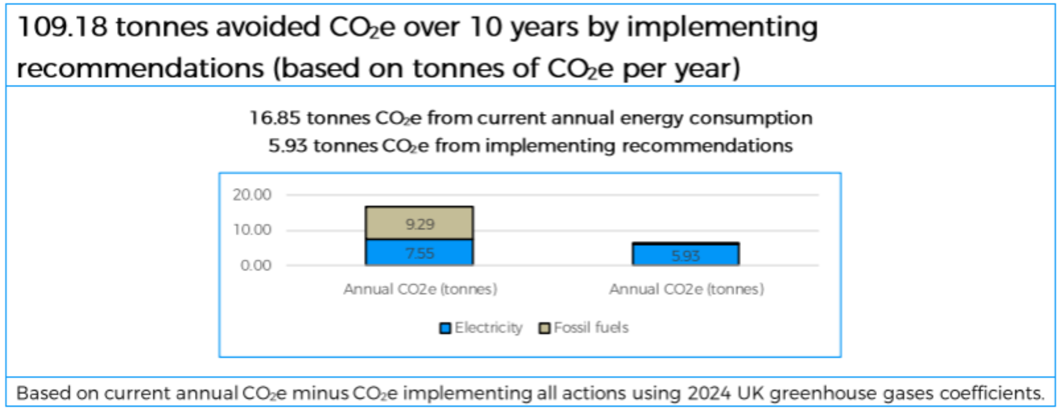
[Dataset Selection - Query - Nomis - Official Census and Labour Market Statistics.]

Appendix – Survey and Audit Responses

Information on energy usage from local businesses in Oxford is insufficient to conduct bottom-up analysis

Energy Demand Survey and Audits

- **Surveys were issued to local businesses** to inform bottom-up analysis of energy usage in the Oxford City Council region.
- 20 responses were received from two surveys. The responses have been compiled and filtered:
  - **Project partner responses are not included in this summary** as these companies' data were directly used in the detailed modelling, based on higher quality engagement.
  - **Businesses not in the Oxford City Council Region** were excluded as out of scope.
  - **In total, 13 responses remained** to inform understanding of business parks and SME industrials not partnered within the project.
- Important data entries from the surveys **are incomplete or of poor quality**:
  - **only nine of the 13 companies considered** provided energy consumption data, while five provided emissions data.
  - **limited breakdown** of energy demand by use case.
  - Data from the **energy audits contradicted some of the survey data**.



Extract from Energy Audit. *Data extracted from an energy audit showing current emissions, derived from electricity and fossil fuel consumption, as well as potential reduced emissions.*

Challenges to Bottom-up Analysis

- The data collected **was insufficient, incomplete, and in some instances contradictory**.
- Additionally, the range of energy consumption and emissions data for businesses in the same sector varied widely (e.g. from 1.2 to 111 tCO_2/year), therefore **defining archetypes from this was not possible**.
- The lack of suitable input data meant that it **was not be possible to conduct a detailed bottom-up analysis** of local industrial energy needs for dispersed sites based on the survey or audit data collected.

Surveys and audits have been reviewed to assess the energy demand for local businesses in the Oxford City Council region

Item	Results					
Industries Surveyed	• Food & Drink • Hospitality • Manufacturing			• Medical • Pharmaceutical • Energy Research	• Commercial printing • Education	
Annual Energy Consumption (MWh/yr) and Common Uses of Energy		Survey Data	Audit Data	Business specific value ranges	What energy is used for, & No. businesses using energy for each purpose (out of 13 total)	
	Natural Gas	7,680	7,815	Survey 54MWh Audit 22MWh (same business)	Space heating	9 / 13
					Process heat	6 / 13
	Electricity	13,867	14,719	Survey 700MWh Audit 753MWh (same business)	Lighting	11 / 13
					Office/lab equipment	9 / 13
					Machinery/Motors	7 / 13
					Space heating	7 / 13
	Total	21,547	22,534	**Comment:** Energy data varies between audit and survey data, and businesses in the same field have very different energy demands – defining archetypes is very challenging		
Common Energy Intensive Equipment	• Gas-fired boilers • High-powered computers			• Medical and lab equipment e.g. high-powered scanners	• Chillers • Heaters	
Emissions (tCO_2/yr)		Survey data	Audit Data	**Comment:** There is a lack of data in the surveys (only 5 out of 13 provided data) and variation in data between the two sources (some audit data contradicts survey data). For example, one business stated 8kg CO_2 emissions in the survey, but the audit stated 4 tonnes CO_2 emissions.		
	Scope 1	940	975			
	Scope 2	2,107	2,407			

Appendix – Oxford Industrial Case Studies

BMW Group's MINI Plant Oxford is the City's major industrial emitter and focussed on decarbonising it's operations

MINI Plant Oxford is a major automotive manufacturing facility located in Oxford, England. The plant has a long history having first opened its doors in 1913. Over the past century, the facility has played a crucial role in the production of iconic Mini vehicles.

Today, **MINI Plant Oxford employs over 3,500 people**, making it a significant employer in the local region. The plant is responsible for the production of a wide range of Mini models exporting them all over the world.

The facility utilizes state-of-the-art manufacturing processes and technologies to ensure the high quality and efficiency of its vehicle production. With its rich heritage and skilled workforce, MINI Plant Oxford continues to be a vital component of the BMW Group's global automotive operations.

Parts of the Assembly Building at MINI Plant Oxford are over 100 years old and the roof spans over 82,000 square metres. To improve the efficiency of this building, **works are currently taking place to insulate the roof and a new heating system is being installed**. Combined, these measures will **reduce energy costs by almost 50%,** while conserving an integral part of the Plant's long-standing history.

The Body Shop has a roof-mounted solar array and when it was first installed in 2014 it was one of the largest in the UK. The photovoltaic system comprises of **11,500 solar panels, covering 20,000 square metres** (equivalent to five football pitches), generates the equivalent of the **electricity consumption of over 930 households, and reduces the annual carbon footprint by around 1,500 tCO_2e.**

12,500	£1,047.9m	9%	OX4 6LN	SCIENCE BASED TARGETS Near-term, Net-zero	2040

Cowley DC

ISO 14001 Environmental Management CERTIFIED

BRITISH SAFETY COUNCIL Globe of Honour 2022 Winner

860,000 Sq Ft

24/5 operations

300 colleagues

12 clients

Advanced Supply Chain Institute

Supporting Research Projects from Oxford Brookes: Top 5 transformation for a sustainable automotive supply chain at Unipart Logistics.

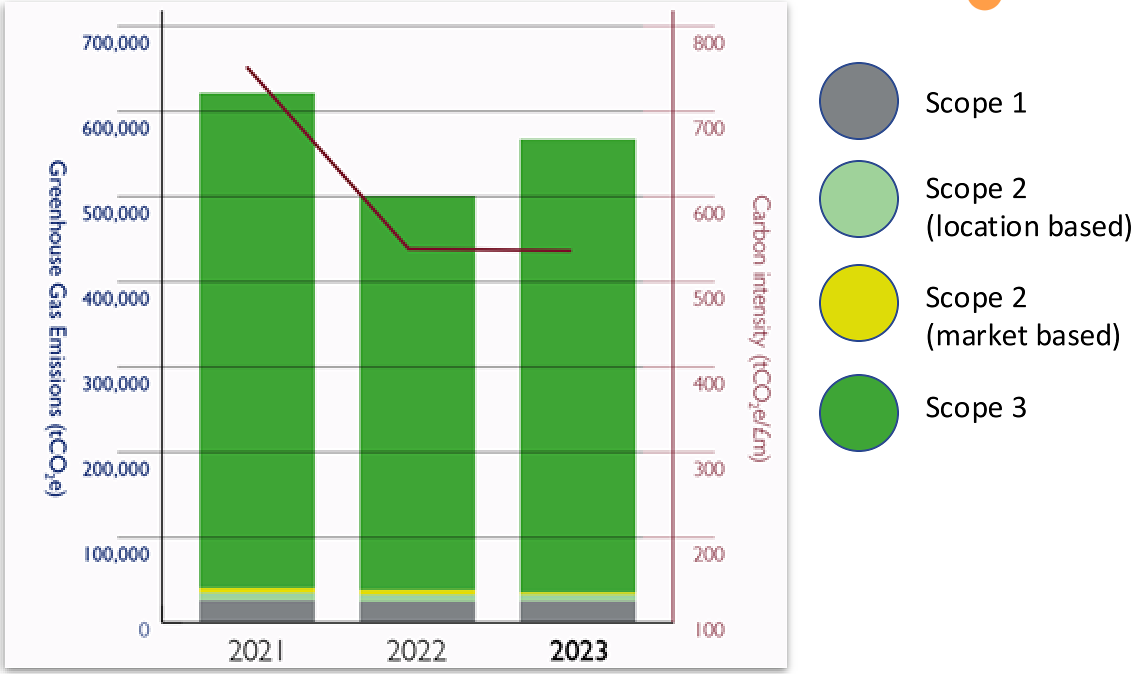
To date Unipart has reduced:

9%

of carbon dioxide equivalent (tCO2e)

4,253 tonnes of carbon dioxide equivalent in Scope 1 and 2 operations

49,212 tonnes of carbon dioxide equivalent in Scope 3 emissions



- **Forward and reverse logistics processes** across 12 clients
- **Green electricity** (546,941 kWh annum, no carbon) and **procured green gas** (513,813 kWh annum, 132.6tCO2e)
- **Consumption reduction targets** of 10% (electricity) and 5% (gas). Cowley **saved 96tCO2e in 2023** by reducing gas consumption by 42%, and reduced this by a further 29% in 2024.
- Key process for energy use is **space heating, lighting** and some **biomass used for heating**
- **Submetering** installed on site projected **12% of energy savings in 2024.**
- **3 day Green Overdrive** event took place in June 2024 to **educate colleagues** and develop **environmental opportunities**

UNIPART OUR CARBON PLEDGE RACE TO ZERO

Seacourt Printing demonstrate the viability of decarbonising industry in Oxford

Seacourt
Planet Positive Printing®

Seacourt offers **printing services**, operating from the Horspath Road Industrial Estate and employing 28 persons. The key process for energy use at the site is printing, but the site uses electricity for lighting, cooling and office equipment, as well as printing machinery.

Seacourt's annual electricity consumption is 189 MWh, in addition to the 36 MWh generated through their own solar PV. Seacourt switched to **100% renewable energy procurement** back in 2003, powering the business **with wind, solar, wave and biomass energy**. Switching to renewable energy saves **709 tCO_2** annually.[1] **They have no gas usage on site**.

Seacourt also uses electric or hybrid company vehicles, which they calculate saves 17 tCO_2 per year.[2]

99.3% of their carbon impact is within their supply chain, but through Climate Impact Partners, **Seacourt offsets 105% of their supply chain's environmental impact**.

- Seacourt's annual Scope 1 emissions - direct emissions from owned, leased or directly controlled mobile sources - total **8.4 kgCO_2e.**
- Seacourt's annual Scope 3 emissions total **1,199 kgCO_2e**.

Seacourt also **invests in carbon reduction projects** that benefit local communities, e.g. Gyapa cook stoves.

Seacourt's Gareth and Nick Dinnage win a prestigious Queen's Award (Image: Seacourt)

Looking forward: Seacourt are testing a **regenerative business model** with Oxford University and sustainability consultancies, considering environmental impact beyond carbon emissions. They also are planning **to install showers and secure bike parking** so more employees can cycle to work, as well as change **all company vehicles to full electric**, and **use cycle couriers** for Oxford customers. Since the majority of their carbon footprint is from Scope 3 emissions, they are also **engaging with their suppliers about renewable energy** and other sustainability strategies.

[1,2] Seacourt-Magazine-Issue-2.pdf (oxfutures.org)

ARC Oxford represents a vision to develop sustainable hubs for science & innovation to catalyse sustainable industrial growth

ARC (Advanced Research Cluster) Oxford is an 88-acre Campus with over 50,000m² of commercial space used by 30 science & innovation businesses, representing a workforce of 3,500 employees in 2023.

By 2030, ARC Oxford is anticipated to double in size, reaching 100,000m² and 7,000 employees. This will significantly impact its **energy demand, increasing from 8–10 GWh/year to an estimated 20–24 GWh/year** as it welcomes more organisations with higher energy needs for advanced sciences.

ARC is aiming to transition its built environment towards Net Zero with a focus on limiting the upfront embodied carbon of its new developments and by cutting operational carbon emissions from its property portfolio. The **main challenge is to phase out fossil fuel as primary energy source for space heating through electrification**, while minimising base building energy demand by applying a Fabric First approach and incorporating Low & Zero Carbon (LZC) technologies at both building and Cluster level.

A Refurb & Retrofit programme has allowed ARC to improve energy performance of its exciting assets, and new developments will be aligned with the highest industry standards. However, deep decarbonisation of ARC Oxford will require strong partnership and collaboration with the science & innovation businesses operating within its buildings.

Existing solutions and emerging innovative technologies will have a key role to play, including but not limited to: **solar car ports, off-site solar generation with private wire connection, privatised distribution network (SmartGrid), and the connection to a heat network**.

ARC Oxford newest development: The Ascent. *An all-electric, BREEAM Excellent lab-enabled building designed to achieve a 40% reduction in operational carbon emissions compared to current building regulations and seeking to meet Planet Mark certification embodied carbon limit of 600kgCO_2e/m².*

ERM

For information on this report,
please contact the authors at:
silvian.baltac@erm.com

For information on the project,
please contact ZCOP at:
smorgan-price@oxford.gov.uk

ZERO CARBON OXFORD